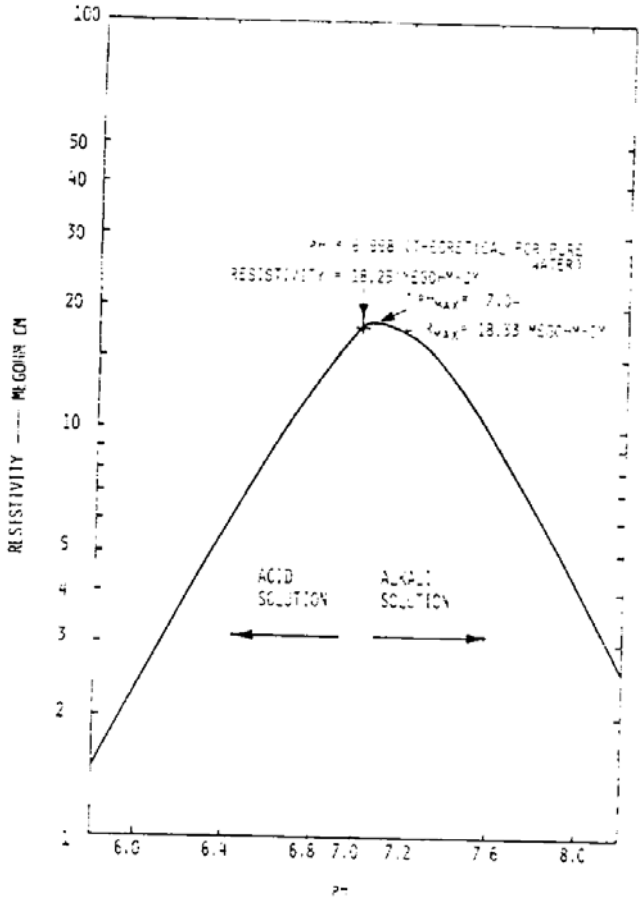
Report

05/11/05

1**. Resistivity vs pH:** There was a concern about the "Resistivity vs pH" triangular diagram that we have been using for our reference because we could not find the primary reference for this diagram. I am still trying to get a copy of the reference of the same that was also referred in Bob's paper. Today, librarian Mary informed me that it will cost $250. Hence, I am trying to get it through IIT Interlibrary loan. I think that this paper might not be the primary source of the diagram though, because this is a conference paper which was presented on 2000 and the diagram seems comparatively older than that (according to Dr Nash). In the mean time I was trying to find out other literatures on this topic.

According to the ASTM standard there are four grades of reagent water. While type I is the most pure (resistivity 16.67 MOhm at 25° C), type IV is also good quality water with permissible amount of impurity. Light and Sawyer have explained the theoretical basics of conductivity measurement. Conductivity of pure water is due to the self ionization of water into hydrogen and hydroxyl ions. It also depends upon a couple of physical constants e.g. water dissociation constant, which are temperature dependent. Hence, resistivity of water varies with temperature. The following diagram was plotted from theoretical calculations at 25° C. Extrapolation point of the curve on the X-axis is 1 MΩ-cm resistivity at 5.5 pH level, which basically confirms ESRF's claim .



["Temperature dependence and measurement of resistivity of pure water", Truman S. Light, *Analytical Chemistry,* 1984, 56, 1138 – 1142]

The paper also does not mention how the diagram (which is very similar to the diagram we have been using) was obtained.

2. **Design of Working Electrode**: We have to prepare a working electrode for ECP determination. Different literatures, including the Korean paper describe their working electrodes. Although, various electrochemistry books suggest using a copper plate as working electrode, the Korean paper mentions that they inserted the copper electrode inside a 316 SS tube. Resin was used in the gap of between 316 SS and copper electrode (Page #7). Various websites also suggest to put the electrode inside resin in such a way that only the bottom tip will be in contact with the electrolyte. Although, I am not very sure about the reason of this special design of the electrodes it might be to minimize any chemical influence from the electrode. If my conjecture is correct, we do not have to worry about it because we are not trying to control the ratio of the copper component surface to the water volume stringently.